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June 12, 1958

CONFIDENTIAL

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Dear Sir:

This letter summarizes the activity under Task Order No. T during April and May, 1958.

A large part of the effort during this period was expended in an attempt to determine more definitely the relative importance of stresses and of corrosion in producing failures. A cursory thermal-stress analysis was performed and this indicated that the magnitudes of the stresses due to thermal gradients were probably high enough to cause failure. Metallographic examination of specimens from the failed retorts indicated that corrosion (particularly nitriding) probably contributed to the propagation of cracks.

A more detailed metallurgical examination of the failed-retort rings was made to determine whether corrosion may have been accelerated by the presence of impurities such as sulfur in the ammonia. Consideration of the various possibilities led to the conclusion that the high stresses were primarily responsible for the cracks. It was further concluded that nitriding was the only significant form of corrosion noted, and that, in the absence of cracks, nitriding alone would not have produced failures in the short time period.

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Plans for the future include preparing the summary report, which will describe recommended changes in assembly procedures directed toward lowering welding stresses and recommended design changes aimed toward reducing thermal stresses. The significance of the maximum operating temperature and warm-up rate will also be discussed in the final report.

The original appropriation under Task Order No. T was \$7,097. As of June 1, 1958, the unexpended balance was approximately \$1,250.

Sincerely,



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ABW:tr

In Duplicate

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